

Of the three hundred or more species of flowering plants found growing around James bay I have mentioned only those that I considered the most interesting, but I do not doubt that future explorations will add many additional species to the list.

Ottawa, Canada.

Jacob Whitman Bailey.¹

STANLEY COULTER.

No sketch of North American botany would be complete were the name of Professor Bailey omitted. The record of his life and work is a record not only of interest, but of inspiration and encouragement to all botanists, in that it shows how great results may be attained, in spite of what to many might have seemed insuperable obstacles.

Jacob Whitman Bailey was born in the old town of Ward (now Auburn), Worcester county, Mass., on the 29th of April, 1811. In his boyhood he gave evidence of a taste for scientific studies, leaving the companionship and sports of those of his own age for solitary wanderings through the woods—not the mere purposeless excursions of boys, but for the collection of plants and minerals, which he afterward classified. This scientific taste seems to have come to him by direct inheritance from both branches of the ancestral line, his great-grandmother Whitman being especially distinguished for her love of botany and astronomy. Even as a boy was manifested that rare and beautiful modesty which characterized his after life. He worked and studied that he might satisfy himself, not that he might distinguish himself or surpass his schoolmates. Owing to the limited resources of the family, he was, at the age of twelve, placed in a circulating library and book store in Providence. In this position he found much time for self-improvement, devoting himself especially to the study of mineralogy and conchology. So earnestly studious was he that he attracted the attention of Mr. John Kingsberry, long secretary of Brown University, who, knowing the difficulties under which he was laboring, invited him to spend certain evenings of the week at his home for the purpose of studying Latin. The remaining

¹ The data for this sketch were furnished by Prof. W. W. Bailey, of Brown University from letters of his father in his possession and from his personal reminiscences.

evenings of the week the boy spent in the study of French with a French teacher. It is a little surprising to learn that he also found time to make a very considerable collection of shells and insects. This habit of making every moment of the day productive became even stronger as he grew in years, and serves to explain how he was able to accomplish what seemed to be impossibilities.

In July, 1828, he received an appointment as cadet at West Point, from which school he graduated fifth in his class in 1832.

After serving at various posts as second lieutenant of artillery, he was, in March, 1834, appointed assistant professor of chemistry at West Point, an occupation far more congenial to one of his studious tastes. In July, 1838, he writes to his brother, informing him of his appointment as professor in charge of the newly constituted department of chemistry, mineralogy and geology. This position he retained to the time of his death, the 27th of February, 1857.

Before passing to an examination of his scientific work, it is but proper to refer to the great tragedy of his life and that which cast a shadow over his later years. He was married in 1835 to Miss Maria Slaughter, of West View, Virginia, and from the glimpses of their after life which we have been permitted to have, the home thus founded must have been one of unusual happiness. In July, 1852, Prof. Bailey, his wife, his only daughter and son Whitman (Prof. W. W. Bailey) were passengers on the steamer Henry Clay, which was burned near Yonkers. When the fire broke out Prof. Bailey succeeded in lowering his wife and daughter into the water, and had just received from them assurances of their safety, when suddenly a cloud of smoke mingled with sheets of flame shut them from his view and they were lost. His son was saved almost as by miracle. Previous to this he had been subject to bronchial affections, and his exertions on this occasion, added to the bitterness of his bereavement, gave him a shock from which he never rallied.

Singularly modest, reserved in manner except to those to whom he had given his friendship, bright and sparkling in conversation with the few chosen ones, of rich poetic taste and fancy, strong in his hate of the wrong, tender and loving in his home—these were his personal traits, and these are traits that make rare men.

Among the earlier scientific passions of Prof. Bailey was that for botany, and throughout his life, even though the

duties of his chair would seem to have left but little time for outside work, he continued its study. Scarcely one of his sketches of his numerous exploring trips but that shows the hand of the trained and accurate botanist. But it was through his work with the microscope, and as a direct result of his knowledge and mastery of it, that he was to win for himself a distinctive place in the botanical world and become "the Ehrenberg of America."² The first purchase he made for himself as a boy was that of a microscope, and from that time a microscope was the constant companion of his journeys. His improvements of its mechanism, his suggestions as to its appliances, have placed all microscopists under obligations to him. His observations were characterized by accuracy and completeness, and his skill with the pencil, added to his habit of making copious notes, furnished him ample data for all subsequent papers.

In 1839 his work upon the diatoms commenced. He was led to this study by the appearance of an object in the field of his glass that he did not fully understand. His attention having been thus attracted, he devoted himself with wonderful zeal to a study of those life forms grouped under the general term infusoria, and soon added to this a study of the algæ, a branch requiring almost as much patience and microscopic skill as the former. When he commenced these studies nothing had been done in this country, and books could not be procured. Gradually, as he worked, he collected the literature of the subject, added to it the result of his own labors, became the active correspondent of Ehrenberg, Kützing, Agardh, and a score of others, and won the high position he holds in these lines of research.

In the pursuit of these studies materials were secured from all possible sources, and worked with astonishing fidelity and skill when we consider their quantity. His bequest to the Boston Society of Natural History included 550 slides, upon which were mounted over 3,000 objects, together with 32 portfolios of algæ, containing some 4,500 specimens.

Prof. Bailey also made a special study of raphides, the results of which were published in 1843 in *Silliman's Journal*, under the title, "On crystals which occur spontaneously formed in the tissues of plants," and are still authority upon the subject. In 1846 Prof. Bailey published in the same journal a paper "On the detection of spirally-dotted or scalariform ducts and other vegetable tissues in anthra-

² Dr. A. A. Gould in Proc. Bost. Soc. Nat. Hist. vol. VI, p. 174.

cite coal," which brought new honor to the unassuming worker. His papers are quite numerous, and are characterized by a terse and direct simplicity that evidences a complete mastery of the subject in hand. Dr. Gray says of them: "They are all clear, explicit and unpretending as they are thorough; and every one of them embodies some direct and positive contribution to science." The majority of these papers, being published in *Silliman's Journal*, are of such easy access that an extended notice of them in this place is unnecessary. Some of the more general sketches, such as the one entitled "Account of an excursion to Mount Katahdin, in Maine," serve to show the wide reach of his knowledge and the grace of his style to a greater degree, perhaps, than his more strictly scientific papers. Omitting all titles, except those pertaining more or less directly to botany, the following list will enable us to appreciate somewhat not only the character of his work, but his wonderful industry. Yet, to fully realize the magnitude of his achievements, it must be remembered that his was the work of breaking paths in hitherto untrodden regions; that he worked virtually without assistance, without literature, without appliances, save those his own ingenuity devised; that, while thus working, he was also filling with distinction his chair in the Military Academy at West Point, and making an equal fame in other branches of scientific research. In the *Synoptical Flora*, Dr. Gray calls him "The pioneer in microscopical research in the United States;" and yet, with all his duties, with all this new world to explore, he found leisure to draw hundreds of carefully finished sketches of knights and ladies, castles and palaces, for the amusement of his invalid son. The titles here given are taken from the catalogue of the Royal Society, and were furnished by his son, Prof. W. W. Bailey, of Brown University:

Account of an excursion to Mount Katahdin, in Maine.—*Silliman's Journal*, xxxii (1837), 20-34.

Observations on the vascular system of ferns and notice of a monstrous flower of *Orchis spectabilis*.—*Silliman's Journal*, xxxv (1839), 113-117.

On fossil infusoria discovered in peat earth at West Point, New York, with some notices of American species of Diatomæ.—*Silliman's Journal*, xxxv (1839), 118-124.

A sketch of the infusoria of the family Bacillaria, with some account of the most interesting species which have been discovered in the United

States.—*Silliman's Journal*, xli (1841), 284-305; xlii (1842), 88-105; xliii (1842), 321-332; American Geol. and Nat. Assoc. Repts. (1843), 112-164.

American Polythalmia from the Upper Mississippi, and also from the cretaceous formations on the Upper Missouri.—*Silliman's Journal*, xli (1841), 400-401.

Yellow showers of pollen.—*Silliman's Journal*, xlii (1842), 195-197.

Notes on the infusoria of the Mississippi river.—Proceedings Boston Soc. Nat. Hist., ii (1845-48), 33-35.

Notice of some new localities of infusoria, fossil and recent.—*Silliman's Journal*, xlviii (1845), 321-343.

On the crystals which occur spontaneously formed in the tissues of plants [1843].—*Silliman's Journal*, xlviii (1845), 17-32; Bibl. Univ. lvi (1845), 388-392; Froriep Notizen, xxxv (1845), col. 65-69.

On the detection of spirally dotted or scalariform ducts and other vegetable tissues in anthracite coal.—*Silliman's Journal*, i (1846), 407-410; Ann. Nat. Hist., xviii (1846), 67-69.

Account of some new infusorial forms discovered in the fossil infusoria from Petersburg, Va., and Piscataway, Md.—*Silliman's Journal*, xlvi (1844), 137-142.

On some new species of American Desmidiaceæ from the Catskill mountains.—*Silliman's Journal*, i (1846), 126-127.

Notes on the algæ of the United States.—*Silliman's Journal*, iii (1847), 80-86, 399-403; vi (1848), 37-42.

On a process for detecting the remains of infusoria, etc., in sedimentary deposits.—Proceedings Amer. Assoc. 1849, 409.

Some remarks on the Navicula Spencerii, and on a still more difficult test object.—*Silliman's Journal*, vii (1849), 265-270.

Discovery of an infusorial stratum in Florida.—*Silliman's Journal*, x (1850), 282.

Reply to Mr. de la Rue's remarks on the Navicula Spencerii contained in the *American Journal of Science*, vol. ix, p. 23: with a notice of two new test objects.—*Silliman's Journal*, 1851, 82-84.

Microscopical observations made in South Carolina, Georgia and Florida [1850].—Smithsonian Contributions, ii (1851).

Microscopical examination of soundings made by the U. S. Coast Survey off the Atlantic coast of the United States.—Smithsonian Contributions, ii (1851); *Edinburgh New Phil. Journal*, li (1851), 359-361; liv (1853), 142-144; *Silliman's Journal*, xii (1851), 132-133; *Journal Micro. Sci.*, iii (1855), 89-91.

List of Diatomaceæ collected by the United States Exploring Expedition under Captain Wilkes.—Proc. Philadelphia Acad. Nat. Sci., vi (1852-53), 431-434.

Observations on a newly discovered animalcule.—*Silliman's Journal*, xv (1853), 341-347; *Journal Micros. Sci.*, i (1853), 295-299.

On a mode of giving permanent flexibility to brittle specimens in botany and zoölogy.—*Silliman's Journal*, XVIII (1854), 100-102; *Ann. Nat. Hist.*, XIV (1854), 373-375.

Reply to some remarks by Mr. W. H. Wenham and notice of a new locality of a microscopic test object.—*Silliman's Journal*, XIX (1853), 28-30.

On a universal indicator for microscopes.—*Silliman's Journal*, XX (1855), 53-65; *Journal Micros. Sci.*, IV (1856), 55-62.

Notes on new species and localities of microscopical organisms [1853].—*Smithsonian Contributions*, VII (1855).

Remarks on Mr. Wenham's paper on aperture of object glasses.—*Silliman's Journal*, XXI (1856), 105-106; *Journal Micros. Sci.*, IV (1856), 160-162.

New method of detecting fossil Diatomaceæ.—*Silliman's Journal*, XXI (1856), 356-357.

On the non-existence of polarizing silica in the organic kingdom.—*Silliman's Journal*, XXI (1856), 357-358; *Ann. Nat. Hist.*, XXIII (1856), 78-79; *Journal Micros. Sci.*, IV (1856), 303-305.

On some specimens of deep sea bottom from the sea of Kamtschatka.—*Silliman's Journal*, XXI (1856), 284-285.

Notice of microscopic forms found in the soundings of the sea of Kamtschatka.—*Silliman's Journal*, XXII (1856), 1-6.

On the origin of green sand and its formation in the oceans of the present epoch.—*Silliman's Journal*, XXII (1856), 280-284; *Ann. Nat. Hist.*, XVIII (1856), 425-428; *Proc. Boston Soc. Nat. Hist.*, V (1854-56), 364-368; *Journal Micros. Sci.*, V (1857), 83-87.

Report upon the result of microscopic examination of soundings made by Lieut. Berryman, of the U. S. Navy, on his recent voyages to and from Ireland in the "Arctic."—*Silliman's Journal*, XXIII (1857), 153-157.

The breadth and accuracy of Prof. Bailey's knowledge are manifest in all of these papers. A few of the titles seemingly foreign to any line of botanical research have been introduced because of the many references contained in the papers which they represent to work done in that direction. Many titles have been omitted altogether, because they only served to give evidence of his ability in the fields of chemistry and geology, and have no place in a sketch of the botanist, unless it be to increase our admiration for the scientist whose strength of mind and keenness of vision enabled him to be both deep and broad.

His work gained for him many tokens of honor and respect from his fellow-workers. At the time of his death he held the position of president of the American Association, and had he lived would have presided at the Montreal meet-

ing of 1857. Many species were dedicated to him, and a genus of the Compositæ commemorates his name. I extract the following from *Plantæ Fendlerianæ*, at page 105, as a fitting conclusion to this brief sketch, giving, as it does, the testimony of Dr. Gray as to the work and merit of Prof. Bailey. Dedicating *Baileya*, a new Composite genus of two species from the Texano-Arkansas district, he says: "This genus is dedicated to Prof. J. W. Bailey, of the U. S. Military Academy, who is particularly distinguished for his researches among the minuter algæ and especially the Diatomaceæ (which he was the first to detect in a fossil state in this country), for his microscopical investigations concerning the crystals contained in the tissues of plants, and for the detection of vegetable structure in the ashes of anthracite."

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A new water-lily.

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(WITH PLATE VII.)

*Castalia Leibergi*¹ n. sp. A diminutive water-lily with white odorless flowers about $1\frac{1}{2}$ inches in diameter when fully expanded: sepals an inch long, narrowly obtuse, the nerves on the inner side very obscure: petals in two rows, a little shorter and more obtuse than the sepals, faintly striped with purple lines: stamens in 3 or 4 rows, running up the ovary slightly more than half-way: stigmatic rays 7 or 8, the projecting points very short and blunt: leaves oblong or oval, with a broad open sinus and obtuse lobes, varying in size from 2 to 4 inches long by $1\frac{1}{4}$ to $2\frac{1}{2}$ inches wide, the veins on the lower surface sunken: petioles and peduncles smooth: rhizome and fruit not seen.

Judging from the length of stems on the specimens examined, the plant must grow in shallow water. It bears much resemblance to *Castalia pygmæa* Salisb., a plant found

¹ The writer is aware that in the present dispute regarding the nomenclature of our water-lilies he is likely to have his property appropriated by the other side whether he adopts the name in the text or calls the plant *Nymphæa Leibergi*, but believing in the "right of priority," both as to generic and specific names, he prefers to follow his own convictions of justice rather than ask which is the larger party in the controversy, or which carries the greater weight of authority.